XXI. *On the Declinations of some of the principal fixed Stars; with a Description of an Astronomical Circle, and some Remarks on the Construction of Circular Instruments. By* John Pond, *Esq. Communicated by* Smithson Tennant, *Esq. F. R. S.*

Read June 26, 1806.

The observations which accompany this Paper were made at Westbury in Somersetshire, in the years 1800 and 1801, with an Astronomical Circle of two feet and a half diameter, constructed by Mr. Troughton, and considered by him as one of the best divided instruments he had ever made; a drawing of it, with a short description, is annexed to the observations. (Plate XX.)

When this instrument came into my possession, I thought I could not employ it in a more advantageous manner, than in endeavouring to determine the declinations of some of the principal fixed stars.* The various catalogues differed so much from each other, and such doubt existed as to the accuracy of those which were thought most perfect; that the declinations of few stars could be considered as sufficiently well ascertained for the more accurate purposes of astronomy.

The advantages that have resulted from the excellent method pursued at Greenwich, of observing constantly the transits of a few stars, to obtain accurately their right ascensions, induced me to follow the same method for determining

* At that time Dr. Maskelyne's late Catalogue was not published.

their declinations; and for a considerable period I constantly observed them on the meridian, whenever they passed at a convenient hour; usually reversing the instrument in azimuth at the end of every day's observation; never considering any observation as complete that had not its corresponding one in a short interval of time. When this circumstance is not attended to, I think, a great part of the advantage arising from the circular construction is lost.

The observations themselves will show, if they have been made with the requisite care and attention to merit the notice of astronomers; for it is one of the many advantages of circular instruments, that from the observations made with them, we may infer with great precision not only the mean probable error, but likewise the greatest possible error to which they are liable. From a careful comparison of the errors of collimation, as deduced from different stars, I concluded that the greatest possible error was $2'',5$, and the mean error about $1''$; and by a comparison with other observations with similar instruments, it will be seen that this supposition was well founded, since nearly the same quantities are deduced by another method to be considered hereafter.

The polar distances are annexed to each observation: a method which I borrowed from Mr. WOLLASTON, and which is rendered very easy by employing his useful tables calculated for that purpose. This practice of reducing every day's observations cannot be too much recommended, as the labour of calculating accumulated observations is thus rendered unnecessary.

When I had deduced the declinations of these stars from my own observations, continued long enough to divest them

of all error, except that arising from defect in the divisions of the intrument, I was desirous of comparing them with the observations made by others; and I have subjoined a comparison of them with all those which I could procure, that seemed entitled to confidence. In the first column are the observations made at Greenwich, as published in 1802 by the Astronomer Royal; the second column contains a catalogue deduced from some observations made at Armagh with a very large equatorial instrument constructed by Mr. TROUGHTON. In the third column are the observations of Mr. PIAZZI, of Palermo; and in the fourth those made at Westbury. All the above mentioned observations are arranged in the order of their polar distances, and the positive deviations separated from the negative; that the cause of error in any of the instruments may be the more easily detected, as likewise any mistake in the assumed latitudes of the respective places of observation.

A general catalogue is then added; which is deduced, by taking the mean, generally of the above four; but in some places, a few detached observations that I have accidentally procured of other circular instruments have been included. The utility of this investigation is not merely confined to the determination of the polar distances of the stars; as besides this some valuable information on other points may be obtained. In the first place, upon examining the variations that appear in these observations a question naturally occurs, whether, by changing the assumed latitudes of the respective places of observation, a nearer coincidence might not be obtained. And I find, that to make the positive deviations equal to the negative, the following corrections should be applied to the co-latitudes.

Greenwich	$+ 1''$
Armagh	$+ 1'',3$
Palermo	$- 1''$
Westbury	$- 0'',25$.

This method of correcting the latitudes has, I believe, never been employed: but it seems reasonable to suppose, that when thus corrected, they will be nearer the truth, than those determined by the usual method: for the same reason, that the declinations of the stars resulting from a general comparison, are more likely to be accurate, than if deduced from any one single set of observations: but if the Greenwich instrument should be affected with any errors independent of the divisions; in that case, we should be unable to infer any thing decisive, as to the latitude, by the above method. But from a comparison of the observations of γ Draconis, observed at Greenwich and Westbury, the latitude of Westbury being previously corrected by the above method, I am inclined to believe the latitude of Greenwich requires a very small correction, certainly not exceeding a second. The result I obtain by a very careful investigation by methods, entirely independent of the Greenwich quadrant, is $51°.28'.39'',4$.

I consider this comparison as interesting likewise on another account; it is an object deserving of curiosity to examine the present state of our best astronomical instruments, and to ascertain what may reasonably be expected from them. The superiority of circular instruments is, I believe, too universally admitted, to render it probable that quadrants will ever again be substituted in their place. But the Greenwich quadrant is so intimately connected with the history of astronomy, the observations that have been made with it, and the deductions

from those observations, are of such infinite importance to the science, that every circumstance relating to it cannot fail of being interesting. Now when it is considered that this instrument has been in constant use for upwards of half a century, and that the center error, from constant friction, would during this time have a regular tendency to increase, it will not appear at all surprising, if the former accuracy of this instrument should be somewhat impaired. With a view, therefore, of ascertaining more correctly the present state of an instrument on which so much depends, I have exhibited in one view the polar distances as determined by circular instruments alone; the respective co-latitudes being previously corrected by the method above mentioned, and I have compared the mean result with the Greenwich Catalogue, that the nature and amount of the deviations may be seen, and if it be judged necessary, corrected. I should add, that by some observations of the sun at the winter solstice in 1800, the difference between the Greenwich quadrant and the circle was 10 or 12″, the quadrant still giving the zenith distance too little.

General Description of the Instrument.

The annexed Plate represents the circle in its vertical position. It was originally made to be used likewise as an equatorial instrument, a circumstance I need not have mentioned, but as an apology for the slightness of its construction, which the artist who made it would not have recommended, had the instrument been intended for the vertical position only.

The declination circle, 30 inches in diameter, is composed of two complete circles; the conical radii of which are inserted

at their bases in an axis about 12 inches long, leaving sufficient space between the limbs for a telescope $3\frac{1}{2}$ feet long, and an aperture of $2\frac{3}{4}$ inches, to pass between. The two circles are firmly united at their extreme borders by a great number of bars, which stand perpendicular between them; the whole of which will be readily understood by referring to the figure. The square frames, which appear as inscribed in the circle, were added to give additional firmness to the whole.

The circle is divided by fine lines into $5'$ of a degree; and subdivided into single seconds by two micrometer microscopes, the principles and properties of which are now too well known to require any particular explanation.

At the time these observations were made, the microscopes were firmly fixed opposite to the horizontal diameter: but when I considered that, by continuing the observations, the error of division would never be diminished, I suggested to Mr. TROUGHTON the possibility of giving a circular motion to the microscopes, though I confess with very little hope, that the thing was really practicable in an instrument previously constructed on other principles. Mr. TROUGHTON approved of the idea, and executed it in a very ingenious manner. His talents, as an artist, are too well known and too highly appreciated, to stand in need of any praise from me; yet I should consider myself as deficient in justice, if I did not endeavour to call the attention of the reader to the skill and ingenuity, which have been employed not only in this very important alteration, but in every contrivance that is peculiar to the instrument, which is the object of our present consideration.

These microscopes can now revolve about 60° from their

horizontal position; and it is easy to comprehend, that by this valuable improvement, all errors of division may be completely done away, without any of the manifest inconveniences of the French circle of repetition; which, though a very ingenious instrument, and admirably adapted to some particular operations, will, I think, never be adopted for general use in our observatories.

The plumb-line, a very material part of this instrument, is suspended from a small hook at the top of the tube at the left hand of the figure. It passes through an angle, in which it rests in the same manner as the pivot of a transit instrument does on its support. At the lower end of the tube which protects it, a smaller tube is fixed at right angles, which contains microscopic glasses so contrived, that the image of a luminous point, like the disc of a planet, is formed on the plumb-line and bisected by it. Great attention should be given to the accurate bisection of this transparent point by the plumb-line *at the moment of observation.* It is absolutely essential in instruments of this construction to consider the observation, as consisting in two bisections *at the same time:* the one of the star by the micrometer, the other of the plumb-line-point by the plumb-line. The least negligence in either of these bisections will render the observation unsuccessful.

The two strong pillars, which support the axis of the vertical circle, are firmly united at their bases to a cross bar; to which also the long vertical axis is affixed, and which may be considered as forming one piece with them. The stone pedestal is hollow, and contains a brass conical socket, firmly fastened to the stone, and reaching almost to the ground. This socket receives the vertical axis, and supports the whole

weight of the moveable part of the instrument, which revolves on an obtuse point at the bottom; the upper part of this vertical axis is kept steady in a right angle, having two springs opposite the points of contact, which press it against its bearings, and it thus turns in these four points of contact with a very pleasant and steady motion.

The bar, in which the vertical axis is thus centered, is acted on by two adjusting screws in directions at right angles, and perfectly independent of each other. By these motions, the axis may be set as truly perpendicular, as by the usual method of the tripod with feet screws, which could not in this case have been employed.

The frame, to which this apparatus is attached, is fixed to the corners of the hexagonal stone, by the conical tubes; between which and the stone, the azimuth circle (which forms one piece with the vertical axis) turns freely. The azimuth circle of two feet diameter consists of eight conical tubes, inserted in the vertical axis; and which are united at their ends by the circular limb; this is divided and read off exactly in a similar manner to the other circle.

A level remains constantly suspended on the horizontal axis, which is verified in the same manner as in a transit instrument. There are forcing screws for this purpose, which pass through the bar on which the vertical columns stand, and these by pressing against the long axis produce a small change in the inclination of the upper part of the instrument, without altering the position of the azimuth circle or its axis.

The application of the plumb-line, as already described, is

peculiar to the instruments made by Mr. TROUGHTON: it regards the vertical axis rather than any other part, and is, in fact, exactly analogous to the usual verification of a zenith sector.

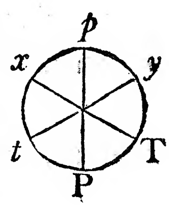
During the period in which I was engaged in making observations with circular instruments, I was led to consider the advantages and inconveniences of the usual method of adjusting them; and it appeared to me, that the essential part of their construction, which relates to their adjustment, was capable of being improved.

In order to render the nature of the improvement, which I wish to propose, more intelligible, I ought previously to remark, that there are, at present in use, two modes of adjusting these instruments, which are founded on different principles.

In the one, two points are taken on the limb of the circle; and when these are brought into a given position, by means of a plumb-line passing over them, the microscope or index is made to coincide with the zero point of the divisions: by this method, the error in collimation remains constant; and, if the adjustment is by any accident deranged, it can easily be rectified, and there will be no absolute necessity for frequently reversing the instrument; so that this method seems well adapted for large instruments, particularly if placed on stone piers. But it is liable to this defect, that the adjustment cannot be examined at the moment of observation; and if any change should take place in the general position of the frame work, the observation will be erroneous without the means of detection. It was probably to avoid this inconvenience, that

Mr. TROUGHTON, in most of his instruments, particularly if they were intended to move freely in azimuth, has preferred the other method.

In this case, the plumb-line is attached to one of the pillars which support the microscopes in the way above described; and it has no reference to any fixed points or divisions on the limb of the circle, but only insures a similarity of position in the index, for each position of the instrument; and, provided that the plumb-line apparatus was free from all danger of derangement, this would be sufficient. This verification may be rendered perhaps more intelligible, by considering that a circular instrument, in whatever manner its vertical axis be placed, indicates by a double observation, the angle which the object makes with the axis, round which the whole instrument has revolved in passing from one position to the other. For let Pp be the axis, Tx the telescope in one position; it is evident, that in turning the instrument half round, ty will then be the position of the telescope: Px being equal to Py. The arc



xy, which the telescope passes through to regain its former position, is the quantity really given by the instrument; and if the axis Pp be vertical, half this quantity is the true zenith distance of the object. Now the intention of Mr. TROUGHTON's verification is to insure a vertical position to the axis Pp.

For instruments which rest on moveable pillars, and turn freely in azimuth, this method is much to be preferred; but it is not without a considerable defect: for, if by any derangement in the plumb-line apparatus, the error in collimation be changed, it cannot be restored with certainty to its former position; so that sometimes a very valuable series of observations

may be lost, for want of a corresponding one to compare with it. The mode which I propose to adopt to remedy these inconveniences, will enable us to combine all the advantages of the two methods above described: it is extremely simple in its principle, and easy of execution, for it merely consists in uniting on the same plumb-line the two principles already explained.

Two very fine holes should be made in the farther limb of the circle, and two lenses firmly fixed opposite to them, in the other, which should each form an optical image of its corresponding dot or hole, in the tube through which the plumb-line passes.* It will be best, if these dots are made exactly in a diameter, as they may then be used in two positions. Beneath these should be formed the image of a luminous point, according to Mr. Troughton's present method, by an apparatus attached to the plumb-line tube; when the two points on the circle move away, by the necessary operation in observing, the lower point will remain stationary, and indicate any change of position in the whole instrument, if such should accidentally take place, and which by the other method alone would have passed unnoticed.

The contrivance above described was executed for me at my request by Mr. Troughton, and is represented in the Plate; but by some accident a part of the apparatus was

* As these transparent dots are intended to be bisected by the plumb-line, they must be capable of the necessary adjustments, both for distinct vision, and for placing them in an exact diameter.

It may be found more convenient in practice to arrange the whole apparatus in sliding tubes, but in whatever way the contrivance be executed, the points should ultimately be fixed as firmly as the divisions of the instrument.

broken in putting it together, so that I never was able to use it. As each apparatus for this adjustment is quite independent of the other, no possible inconvenience can attend their application, as either may be employed alone, at the option of the observer. But as any verification requiring many bisections is objectionable, I would in general certainly prefer Mr. TROUGHTON's method, and only have recourse to the other, when there was reason to suspect that some alteration had taken place to render it necessary.

One more circumstance respecting the instrument remains to be noticed: when the divisions were first examined by opposite readings, 1″,25 was the greatest possible error which was to be apprehended, and 0″,7 the mean error; but in its journey it seemed to have suffered some very small derangement in its form: this was discernible both from examining the opposite readings; and by deducing the error of collimation by zenith stars, and comparing it with that found by an horizontal object, there was constantly perceived a difference of 3″ between the error of collimation deduced from γ Draconis and by an horizontal object; and this quantity was very uniformly distributed through the intermediate arc. In what particular manner the observations would be affected by this derangement I will not venture to decide, but I think it most likely that it has only rendered the instrument rather less accurate than it was originally, as is above stated. I have before observed the great advantage the circle possesses of showing the amount of its own errors. These may be determined with great certainty by examining the errors of collimation as deduced from different stars. This method is founded upon the supposition that half the difference of the two extreme

quantities is the greatest error of division, which has in this case influenced each result in an opposite direction. For instance, let us suppose the errors of division never to exceed 2″, but occasionally to amount to that quantity, on several parts of the circle; it will then sometimes occur that each index will give 2″ too much in one position of the instrument, and 2″ too little in the other; there will then appear a difference of 4″ in the error of collimation; but the observations in these extreme cases will not on that account be the less to be depended on; on the contrary, the probability is in favour of their superior accuracy.

Nor, on the other hand, will those observations which give the mean error of collimation deserve greater confidence than the rest, since it is evident that some of them may be, and most probably are, affected with the greatest possible error; for we suppose the most erroneous observation to arise from the greatest error of division occurring on each of the four arcs in the same sense, that is all *plus* or all *minus;* nevertheless, the observation thus erroneous, will give the mean error of collimation.

By an attentive consideration of these circumstances, corrections might perhaps be obtained which would somewhat diminish the probability of error. But it is to the principle of the revolving microscopes, that in the future construction of instruments we should look for perfection. In the French circle of repetition, too great a sacrifice is made to the supposed advantage of reading off a great number of observations at once. Our best instruments are too well constructed to stand in need of this contrivance, as the divisions on a two-feet circle are read off with precision to a single second.

The errors of simple division alone are those which continued observations have no tendency to diminish; these, by making the microscopes revolve, may be completely done away. An instrument thus constructed would be well adapted to detect small motions in the fixed stars which hitherto have escaped notice, or such as are but imperfectly known; for we cannot reasonably conclude that what is termed the proper motion of a star is so uniform and constant, that being once determined, it will remain always the same.

In the following observations, the larger number expresses the altitude, $+90°$, and the smaller number the zenith distance; the thermometer was attached to the telescope.

In reducing the observations of 1801, the proper motions are allowed for, according to the latest tables of Dr. MASKELYNE.

γ Pegasi.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800 The Co-latitude 38.45.43,0.
1800	° ′ ″	Inches.	°	″	° ′ ″	° ′ ″
Nov. 3	142.50.27,5	29,2	48	42,5		
7	37. 9.27,8	29,2	51	42,5	37. 9.30,1	75.55.36,7
11	37. 9.26,9	29,6	48	43,3		
17	142.50.50	29,7	47	43,7	37. 9.28,4	75.55.35,0
18	37. 9.46,7	30,1	44	44,5		
19	37. 9.47	30,2	41	45	37. 9.31,3	75.55.38,0
20	142.50.44,5	30,3	41	45,1		
25	142.50.24,6	29,0	51	42,4	37. 9.31,7	75.55.38,3
26	37. 9.28	29,5	44	43,7		
27	142.50.26,8	29,6	42,5	43,9	37. 9.32,3	75.55.38,9
29	37. 9.31,5	30,0	42	44,5		
30	37. 9.28,2	30,0	45	44,2	37. 9.29,4	75.55.36,0
Dec. 6	142.50.29,5	29,2	40	43,7		
7	142.50.26,5	29,4	40	44,0	37. 9.30,2	75.55.37,0
8	37. 9.27	29,5	38	44,4		
16	37. 9. 2,1	30,0	44	44,3		
24	142.49.54,5	29,3	48	43,0	37. 9.30,1	75.55.36,0
25	37. 8.54,7	29,4	47	43,2		
31	37. 9. 0,2	29,9	39	44,7		
1801						
Jan. 1	37. 9. 0	29,7	43	44,0	37. 9.32,3	75.55.37,5
3	142.49.55,9	29,7	47	43,6		
	Mean polar distance for Jan. 1800				- -	75.55.37,0

α Arietis.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800
1800						
Dec. 24	151.16.12,7	29,4	46	31,3	28.43.12,9	67.29.22,0
25	28.42.38,5	29,4	46	31,3		
26	28.42.37,2	29,4	43	31,5		
27	28.42.38,2	29,6	43	31,7		
1801					28.43.11,7	67.29.20,8
Jan. 1	28.42.38,2	29,7	45	31,7		
3	151.16.14,6	29,8	44	31,9		
7	28.43.33,0	30,0	45	32,0		
10	28.43.32,0	30,1	47	32,0		
14	28.43.30,0	29,9	45	31,9	28.43.11,3	67.29.20,0
16	151.17. 9,0	29,6	46	31,5		
17	151.17. 8,7	29,6	46	31,5		
	Mean polar distance for Jan. 1800				- - -	67.29.20,6

α Ceti.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co latitude 38.45.43,0
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Jan. 14	47.56.29,6	29,9	45	1.4,4		
16	132. 4.13,2	29,7	45	1.3,8	47.56. 8,4	86.42. 9,4
17	132. 4.12,3	29,6	45	1.3,5		
24	132. 3.47,9	29,8	35	1.5,8	47.56.10,7	86.42.11,2
25	47.56. 9,3	29,8	35	1.5,8		
	Mean -	-	-	- -	-	86.42.10,3

Aldebaran.

1800 Dec. 24	144.51. 8,2	29,4	46	40,2		
1801 Jan. 1	35. 7.43,3	29,7	43	41,0	35. 8.17,5	73.54.17,5
20	144.51.43,2	29,9	48	40,8	35. 8.15,5	73.54.14,5
24	35. 8.14,3	29,8	35	41,8		
25	35. 8.14,8	29,8	35	41,8	35. 8.16,0	73.54.14,8
29	144.51.42,6	29,7	45	40,7		
Feb. 6	144.51.41,3	30,0	49	40,7	35. 8.17,0	73.54.15,5
7	35. 8.15,4	30,1	45	41,2		
	Mean polar distance Jan. 1800	-	-	-		73.54.15,5

Capella.

1800 Dec. 24	174.32. 3,5	29,4	46	5,5		
1801 Jan. 1	5.26.42,1	29,7	43	5,6	5.27.19,2	44.13.19,1
14	5.27.31,1	29,9	45	5,6	5.27.14,8	44.13.16,9
17	174.33. 1,5	29,6	45	5,5		
20	174.32.39,4	29,9	48	5,5	5.27.14,8	44.13.17,6
24	5.27. 9,0	29,8	35	5,8		
27	5.27. 9,7	29,7	41	5,6	5.27.14,9	44.13.18,3
29	174.32.39,9	29,7	46	5,6		
Feb. 23	5.27. 3,8	29,2	46	5,5	5.27.12,8	44.13.17,7
24	174.32.38,2	29,6	42	5,6		

Capella (continued.)

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan 1800. The Co-latitude 38.45.43,0.
	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
26	5.27. 3,6	29,9	45	5,6	5.27.12,6	44.13.17,7
Mar. 4	174.32.38,4	30,3	51	5,6		
7	174.32.37,9	30,2	51	5,6	5.27.14,0	44.13.19,8
8	174.32.37,7	30,0	46	5,6		
12	174.32.38,0	29,4	45	5,5		
23	5.27. 6,0	29,3	48	5,5		
31	5.27.27,5	30,2	55	5,5	5.27.14,9	44.13.19,5
April 1	174.32.57,7	30,2	59	5,5		
	Mean - - - - - - - -					44.13.18,5

Rigel.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan 1800.
1801						
Jan. 14	59.41. 6,0	29,9	45	1.39,2	59.40.45,3	98.26.36,5
17	120.19.35,5	29,6	45	1.38,2		
20	120.19.11,5	29,9	48	1.38,5	59.40.48,0	98.26.38,5
24	59.40.47,4	29,8	35	1.41,2		
27	59.40.46,0	29,7	41	1.39,5	59.40.47,5	98.26.37,5
29	120.19.11,2	29,7	46	1.38,3		
Feb. 6	120.19.13,7	30,0	50	1.38,3	59.40.46,0	98.26.35,0
7	59.40.45,5	30,1	46	1.39,5		
23	120.19. 7,4	29,2	42	1.37,6	59.40.49,5	98.26.37,5
26	59.40.46,5	29,9	45	1.39,0		
Mar. 3	120.19. 6,2	30,3	53	1.38,8	59.40.48,0	98.26.35,5
4	120.19. 7,7	30,3	51	1.39,3		
7	120.19. 3,5	30,2	46	1.39,0		
8	120.19. 6,5	30,0	45	1.38,6		
12	120.19. 5,0	29,4	48	1.37,0		
23	59.40.42,0	29,3	45	1.37,3		
31	59.41. 2,0	30,2	55	1.37,8	59.40.48,4	98.26.35,9
April 1	120.19.25,2	30,2	59	1.37,0		
2	59.41. 5,8	30,1	63	1.35,6	59.40.50,0	98.26.37,6
3	120.19.26,0	30,0	64	1.35,0		
	Mean - - - - - - - -					98.26.36,5

β *Tauri.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38 45.43,0.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Dec. 24	157.10.53,2	29,4	46	24,0	22.48.34,8	61.34.32,5
1801 Jan. 1	22.48. 2,9	29,7	43	24,4		
14	22.48.55,0	29,9	45	24,4	22.48.35,0	61.34.32,5
17	157.11.45,0	29,6	45	24,2		
20	157.11.21,2	29,9	48	24,3	22.48.36,6	61.34.34,0
24	22.48.34,5	29,8	35	25,0		
25	22,48.35,0	29,8	35	25,0	22.48.36,5	61.34 34,0
27	22.48.34,6	29,7	41	24,6		
29	157.11.21,8	29,7	46	24,2		
Feb. 6	157.11.22,8	30,0	50	24,2	22.48.35,1	61.34.33,0
7	22.48.33,0	30,1	46	24,5		
23	157.11.18,3	29,2	42	24,0	22.48.35,2	61.34.33,5
26	22.48.29,0	29,9	45	24,5		
Mar. 3	157.11.19,2	30,3	53	24,3	22.48 35,1	61.34.33,7
4	157.11.21,1	30,3	51	24,4		
7	157.11.17,5	30,2	46	24,6		
8	157.11.17,2	30,0	45	24,6		
12	157.11.19,3	29,4	48	23,9		
23	22.48.28,8	29,3	45	23,8		
31	22.48.50,6	30,2	55	24,1	22.48.35,9	61.34.34,0
April 1	157.11.38,8	30,2	59	23,9		
	Mean -	-	-	-	- -	61.34.33,7

α *Orionis.*

1801						
Jan. 14	43.52.59,5	29,9	45	56,0	43.52.38,8	82.38.30,5
17	136. 7.42,0	29,6	45	55,4		
20	136. 7.16,5	29,9	48	55,5	43.52.41,6	82.38.31,0
24	43.52.39,7	29,8	35	57,2		
27	43.52.39,2	29,7	41	56,2	43.52.40,5	82.38.30,5
29	136. 7.18,2	29,7	45	55,7		
Feb. 6	43.52.39,7	30,0	50	55,4	43.52 41,9	82.38 31,4
7	136. 7.16,0	30,1	46	56,2		
	Mean -	-	-	-	-	82.38 31

Sirius.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Jan. 25	67.41.23,0	29,8	35	2.24,1	67.41.22,0	106.27. 1,8
29	112.18.39,2	29,8	44	2.22,0		
Feb. 20	67.41.24,0	29,5	44	2.20,5	67.41.26,0	106.27. 3,0
22	112.18 32,2	29,2	43	2.19,5		
27	112.18.31,5	29,9	45	2.21,0	67.41.25,5	106.27. 1,5
Mar. 4	67.41.22,5	30,3	49	2.21,3		
	Mean	-	-	-	- -	106.27. 2,1

Castor.

1801						
Feb. 26	18.55.22,0	29,9	45	19,5	18.55.30,2	57.41.14,8
27	18.55.21,8	29,9	45	19,5		
Mar. 4	161. 4 24,5	30,3	50	19,7		
7	161. 4 20,5	30,3	45	19,8		
8	161. 4 22,9	30,0	44	19,6	18.55.27,2	57.41.12,6
15	18.55.17,2	29,6	42	19,5		
April 2	18.55.41,3	30,1	56	19,1	18.55.27,1	57.41.13,5
3	161. 4.47,2	30,0	58	19,0		
17	18.55.47,3	29,8	50	19,3	18.55.29,1	57.41.15,5
18	161. 4.49,1	30,0	50	19,4		
	Mean	-	-	-	- -	57.41.14,0

Procyon.

1801						
Feb. 20	45 30.42,9	29,5	45	58,4	45.30.45,7	84.16.22,1
22	134.29.11,4	29,2	43	58,1		
24	45.30.37,8	29,6	40	59,3	45.30.45,1	84.16.21,2
26	45.30 44,2	29,9	45	59,2		
27	45.30.41,2	29,9	45	59,2		
Mar. 4	134 29.12.2	30,3	50	59,3		
7	134.29 10,0	30,3	45	60,0		
8	134.29.10,0	30,0	44	59,5		
15	45.30 38,5	29,6	42	59,0		

Procyon. (continued.)

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45 43,0.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
April 2	45.31. 1,0	30,1	56	58,0	45.30.45,0	84.16.21,1
3	134.29.31,0	30,0	58	57,5		
17	45.31. 7,8	29,8	50	58,3	45.30.46,0	84 16.21,6
18	134.29.35,8	30,0	50	58,7		
19	134.29.38,0	30,0	52	58,5		
	Mean	-	-	-	-	84.16.21,5

Pollux.

1801						
Feb. 24	22.44.24,5	29,6	40	24,5	22.44.31,5	61.30.14,0
26	22.44.27,4	29,9	45	24,7		
27	22.44.27,0	29,9	45	24,7		
Mar. 4	137.15.21,1	30,3	50	24,4		
7	137.15.22,7	30,3	45	24,8		
8	137.15.23,1	30,0	44	24,6		
15	22.44.23,0	29,6	42	24,3		
April 2	22.44.44,5	30,1	56	24,0	22.44.29,2	61.30 12,7
3	157.15.46,2	30,0	58	23,8		
	Mean	-	-	-	-	61.30.13,7

Regulus.

1800						
Oct. 31	38.17.54,6	30,0	45	46,12	38.17.57,3	77. 3.34,0
Nov. 5	141.42.00	29,5	44	45,48		

β Leonis.

1800						
Nov. 13	35.32.59,9	29,8	50	41,7	35.33. 2,6	74.18.31,5
14	144.26.54,6	29,4	50	41,7		
17	35.33.15,2	29,9	43	42,5	35.33. 1,8	74.18.29,5
18	144.27.11,7	30,1	38	42,8		
1801						
Nov. 8	144.27.22,0	30,0	42	42,0	35.33.27,0	74.18.35,5
13	35.33.15,8	30,0	44	41,8		
	Mean	-	-	-	-	74.18.32,5

Spica Virginis.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Colatitude 38.45.43,0.
1800	° ′ ″	Inches	°	′ ″	° ′ ″	° ′ ″
Nov. 17	61.21.31,5	30,0	45	1.46,5		
18	61.21.29,7	30,1	40	1. 4,8	61.21.11,3	100. 6.43,3
19	118.39. 8,0	30,3	40	1.48,5		
25	118.38.48,6	29,3	44	1.44,5		
27	118.38.45,8	29,7	39	1.47,2	61.21.12,3	100. 6.42,9
Dec. 1	61.21.13,3	29,6	44	1.45,2		
2	61.21.10,2	29,4	43	1.45,0		
7	118.38.44,5	29,3	38	1.46,0		
9	61.21.12,1	29,6	38	1.46,8	61.21.13,3	100. 6.42,5
10	61.21.11,3	29,6	41	1.46,1		
12	61.21.10,2	29,8	42	1.46,7		
	Mean -	-	-	-	-	100. 6.43,0

Arcturus.

1800						
Nov. 16	148.59.34,1	29,6	48	34,3	31.00.41,8	69.46. 8,5
17	31.00.57,6	30,0	46	35,1		
18	31.00.55,8	30,2	42	35,6	31.00.42,3	69.46. 8,2
19	148.59.31,1	30,3	42	34,6		
25	148.59. 7,9	29,3	45	35,0	31.00.46,6	69.46.10,7
26	31.00.41,2	29,6	41	35,0		
27	148.59. 8,5	29,8	39	35,2	31.00.46,5	69.46.10,5
28	31.00.41,6	29,8	42	35,2		
Dec. 1	31.00.42,7	29,6	44	34,7	31.00.45,0	69.46. 8,0
2	148.59.12,7	29,4	44	34,5		
6	148.59. 8,2	29,3	38	35,0		
7	31.00.40,8	29,6	40	35,0	31.00.46,7	69.46. 8,5
9	31.00.42,4	29,6	38	35,1		
	Mean -	-	-	-	- -	69.46. 9,0
Corrected for the proper motion of the star					- -	69.46. 7,5

α *Coronæ.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Nov. 5	23.50.37,0	29,6	49	25,2	23.50.42,2	62.36.13,0
6	23.50.39,4	29,3	51	24,9		
13	156. 9.13,9	29,7	48	25,4		
17	156. 9.34,8	29,6	49	25,2	23.50.42,6	62.36.11,5
19	23.50.59,0	30,2	44	26,0		
20	156. 9.32,8	30,3	43,5	26,1		
25	156. 9. 9,7	29,4	46	25,3	23.50.46,5	62.36.13,5
26	23.50.41,8	29,6	42	25,7		
27	156. 9. 7,6	29,8	41	25,9	23.50.47,7	62.36.14,4
28	23.50.43,1	29,8	44	25,7		
29	23.50.43,7	30,0	44	25,8	23.50.47,9	62.36.13,4
Dec. 2	156. 9. 7,9	29,4	44	25,4		
7	23.50.44,4	29,5	41	25,7	23.50.49,1	62.36.13,0
9	23.50.44,9	29,6	39	25,7		
26	23.50.23,3	29,6	41	25,6	23.50.56,6	62.36.14,0
30	23.50.24,0	29,5	35	25,8		
1801 Jan. 3	156. 8.30,4	29,7	44	25,6		
	Mean	-	-	- -	-	62.36.13,0

α *Serpentis.*

1800 Dec. 2	135.49.25,0	29,4	24,4	55,8	44.10.34,0	82.56. 2,0
7	44.10.34,5	29,5	40	56,5		
9	44.10.34,3	29,6	39	56,8		

α *Ophiuchi.*

1800 Nov. 5	38.31.10,4	29,6	49	45,6	38.31.13,5	77.16.52,2
13	141.28.44,3	29,7	48	45,7		
14	141.28.42,6	29,8	51	45,6		
19	38.31.31,4	30,2	44	46,9	38.31.21,1	77.16.54,5
20	141.28.48,9	30,3	44	47,0		

α *Ophiuchi. (continued.)*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Nov. 26	38.31.13,2	29,4	46	45,4	38.31.16,7	77.16.53,3
27	141.29.39,9	29,6	45	45,8		
Dec. 25	38.30.51,6	29,4	44	45,6	38.31.24,0	77.16.53,6
26	38.30.51,5	29,6	43	46,0		
1801						
Jan. 3	141.28. 3,3	29,7	46	45,9		
	Mean	-	-	-	-	77.16.53,5

α *Lyræ.*

1800						
Oct. 31	12 37.42,6	29,9	50	12,7	12.37.46,5	51.23.36,5
Nov. 3	167.22. 9,6	29,2	51	12,6		
17	167.22.28,2	29,6	49	12,8	12.37.46,8	51.23.34,2
18	12.38. 0,8	30,0	45	13,0		
20	167.22.26,1	30,3	43	13,2		
25	167.22. 2,7	29,0	56	12,3	12.37.51,0	51.23.36,7
26	12.37.44,5	29,4	46	12,8		
28	167.22. 4,5	29,8	41	13,1	12.37.48,7	51.23.33,8
29	12.37.42,0	29,9	43	13,1		
30	12.37.45,0	30,0	46	13,0	12.37.52,6	51.23.36,8
Dec. 2	12.37.47,9	29,6	44	12,9		
3	167.22. 2,0	29,4	45	12,8		
8	167.22. 0,1	29,5	42	12,9		
24	167.21.25,7	29,3	50	12,6	12.37.59,0	51.23.35,0
25	12.37.23,7	29,4	48	12,7		
1801						
Jan. 2	167.21.26,4	29,7	50	12,8		
3	167.21.23,3	29,7	46	12,9		
14	12.38.22,7	29,9	48	13,0	12.38. 1,8	51.23.34,0
15	167.22.20,0	29,7	48	13,0		
17	167.22.18,3	29,6	45	12,9		
21	12.38. 3,0	29,6	48	12,8	12.38. 8,0	51.23.37,8
22	12.38. 3,0	29,4	40	13,0		
23	167.21.48,0	29,6	36	13,2		
24	167.21.46,0	29,6	36	13,2		

α Lyræ. (continued.)

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Feb. 4	167.21.45,7	29,9	51	12,8		
5	167.21.43,7	29,8	50	12,8		
6	167 21.44,0	30,1	45	13,0	12.38.11,8	51.23.37,4
9	12.38. 6,1	30,1	40	13,1		
13	12.38. 8,0	29,6	31	13,3		
22	167.21.38,1	29,2	40	13,0	12.38.13,0	51.23.35,8
23	12.38. 4,0	29,3	40	13,3		
Nov. 9	12.37.32,4	30,0	50	12,9		
10	12.37.32,3	29,0	51	12,8	12.37.43,6	51.23.35,5
14	167.22. 5,1	30,0	49	12,9		
21	12.37.32,5	29,4	45	12,8		
30	12.37.34,2	28,9	40	12,7		
Dec. 10	12.37.37,7	29,3	46	12,7	12.37.49,3	51.23.35,3
13	167.21.56,5	29,6	46	13,0		
14	167.21.56,0	29,6	38	13,0		
	Mean	-	-	-	-	51.23.36,0

α Aquilæ.

1800						
Nov. 18	42.53.14,0	30,0	45	54,0	42.53.00,0	81.38.49,0
20	137. 7.13,9	30,3	43	54,7		
26	42.53. 1,2	29,4	44	53,4	42.53. 3,9	81.38.52,0
28	137. 6.53,3	29,6	42	53,9		
29	42.52.57,5	29,9	44	54,2	42.53. 2,6	81.38.50,2
Dec. 3	137. 6.52,3	29,4	45	53,1		
24	137. 6.17,9	29,3	48	52,7	42.53. 8,5	81.38.52,7
31	42.52.35,0	29,7	39	54,5		
1801						
Jan. 3	137. 6.19,6	29,7	50	52,9		
4	137. 6.19,2	29,7	48	53,1		
14	42.53.29,1	29,9	48	53,6	42.53. 9,5	81.38.50,7
15	137. 7.10,0	29,7	45	56,6		
22	42.53.10,8	29,4	40	53,8	42.53.14,0	81.38.53,0
Feb. 6	137. 6.42,7	31,0	45	54,3		
	Mean		-	-	-	81.38.51,5

α ♑.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Nov. 18	64.23.39,0	30,0	45	2. 1,5		
19	64.23.40,8	30,1	44	2. 2,0	64.23.24,5	103. 9. 8,6
20	115.36.51,8	30,3	42,5	2. 3,2		
26	64.23.19,2	29,5	45	1.59,2	64.23.22,5	103. 9. 6,6
28	115.36.34,0	29,8	42	2. 1,4		
	Mean	-	-	-	-	103. 9. 7,6

α *Cygni.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800.
1800						
Nov. 17	173.20.38,8	29,6	49	6,7	6.39.32,2	45.25.34,1
18	6.39.43,3	30,0	45	6,8		
19	6.39.46,1	30,2	44	6,8	6.39.33,7	45.25.35,3
20	173.20.38,6	30,3	42	6,9		
25	173.20.16,0	29,0	53	6,5	6.39.37,2	45.25.37,8
26	6.39.30,5	29,4	45	6,7		
28	173.20.18,4	29,8	41	6,8	6.39.35,0	45.25.35,5
29	6.39.28,3	29,9	43	6,8		
30	6.39 29,4	30,0	46	6,8	6.39.35,8	45.25.36,0
Dec. 2	173.20.17,8	29,6	44	6,7		
3	173.20.17,8	29,4	44	6,7	6.39.35,0	45.25.35,0
8	6.39.28,3	29,5	42	6,8		
16	6.39. 5,0	29,6	38	6,8		
25	6.39. 5,2	29,4	48	6,7		
31	6.39. 6,3	29,7	48	6,7	6.39.43,7	45.25.36,8
1801						
Jan. 2	173.19.39,7	29,9	43	6,8		
3	173.19.39,8	29,7	50	6,7		
22	6.39.47,4	29,6	45	6,7		
23	6.39.47,0	29,4	40	6,8	6.39.52,4	45.25.39,5
25	173.20. 2,6	29,6	36	6,9		
29	173.20. 2,0	29,8	46	6,7		
Feb. 19	6.39.54,2	29,5	46	6,7	6.39.59,9	45.25.40,2
22	173.19.54,3	29,2	42	6,7		
April 2	6.40.17,2	30,0	54	6,7	6.40. 5,2	45.25.39,0
4	173.20. 6,8	29,8	43	6,7		

α *Cygni. (continued.)*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan 1800. The Co-latitude 38.45.43,0.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
April 5	6.40.20,7	29,8	45	6,7	6.40. 6,0	45.25.39,7
7	173.20. 8,8	29,6	45	6,7		
8	173.20.10,2	29,6	40	6,8	6.40. 4,1	45.25.37,7
10	6.40.18,3	29,5	42	6,8		
11	6.40.22,8	29,6	40	6,8	6.40. 6,3	45.25.39,7
12	6.40.22,5	30,2	35	7,0		
13	173.20. 9,6	30,2	39	6,9		
14	173.20.10,7	30,0	42	6,8		
Nov. 8	173.20.27,2	29,8	45	6,8	6.39.22,3	45.25.37,6
9	6.39.11,8	30,0	48	6,8		
13	6.39.10,0	29,9	48	6,8	6.39.21,3	45.25.36,3
14	173.20.27,4	30,0	48	6,8		
18	173.20.24,2	29,5	43	6,7	6.39.22,3	45.25.36,6
19	6.39. 8,8	29,6	42	6,7		
26	173.20.22,5	29,4	45	6,7	6.39.22,7	45.25.36,0
30	6.39. 9,7	29,0	40	6,7		
Dec. 1	6.39. 9,7	29,0	40	6,7	6.39.23,0	45.25.35,8
2	6.39. 9,2	29,0	40	6,7		
3	173.20.23,2	29,6	40	6,8		
7	173.20.24,7	29,4	40	6,8		
9	173.20.23,2	28,7	47	6,5	6.39.24,0	45.25.35,6
11	6.39.10,9	29,6	45	6,7		
13	173.20.21,2	29,6	38	6,8	6.39.26,0	45.25.36,2
14	173.20.22,7	29,6	38	6,8		
16	6.39.14,5	29,3	35	6,8		
17	6.39.14,0	29,5	35	6,8		
	Mean - - - - - -					45.25.37,0

α *Aquarii.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Nov. 17	137.29. 6,7	29,7	46	1.14,8	52.31. 8,7	91.17. 4,3
18	52.31.24,1	30,1	45	1.16,5		
19	52.31.26,7	30,2	41	1.17,2	52.31.11,0	91.17. 6,4
20	137.29. 4,8	30,3	41	1.17,5		
26	52.31. 3,9	29,5	44	1.14,9	52.31. 7,7	91.17. 2,7
28	137.28.48,4	29,8	41	1.16,3		
29	52.31. 6,1	29,9	43	1.16,1	52.31.10,2	91.17. 5,0
Dec. 2	137.28.45,7	29,5	44	1.15,0		
3	137.28.47,2	29,4	42	1.15,0	52.31.10,0	91.17. 4,6
8	52.31. 7,3	29,5	40	1.15,7		
	Mean	-	-	-	- -	91.17. 4,6

α *Pegasi.*

1800						
Nov. 17	142.54.25,9	29,7	46	43,5	37. 5.53,0	75.51.57,2
18	37. 6.11,9	30,1	44	44,4		
19	37. 6.10,0	30,2	40	45,0	37. 5.54,1	75.51.58,0
20	142.54.21,8	30,3	40	45,2		
26	37. 5.49,8	29,5	44	43,5	37. 5.54,8	75.51.58,7
27	142.54.00,1	29,6	42	43,9		
Dec. 24	142.53.30,0	29,3	47	43,0	37. 5.56,8	75.51.58,7
25	37. 5.23,7	29,4	47	43,0		
26	37. 5.25,0	29,4	43	43,4	37. 5.56,0	75.51.57,2
31	37. 5.24,0	29,8	38	44,4		
Jan. 1	37. 5.22,8	29,7	45	43,6		
3	142.53.32,1	29,7	47	43,4		
	Mean	-	-	-	- -	75.51.58,0

α *Andromedæ.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38.45.43,0.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Nov. 17	156.45.37,2	29,75	47	24,8	23.14.38,4	62.00.48,4
18	23.14.54,0	30, 1	44	25,2		
19	23.14.58,2	30, 2	41	25,5	23.14.40,6	62.00.49,6
20	156.45.37,0	30, 3	41	25,5		
25	156.45.13,7	29, 0	51	24,0	23.14.41,0	62.00.51,2
26	23.14.35,8	29, 5	44	24,8		
27	156.45.14,2	29, 6	42,5	25,0	23.14.40,3	62.00.50,7
29	23.14.35,5	30, 0	42	25,3		
30	23.14.38,3	30, 0	45	25,0	23.14.39,0	62.00.49,4
Dec. 6	156.45.20,2	29, 2	40	24,8		
7	156.45.18,5	29, 4	39	25,0	23.14.38,3	62.00.48,5
8	23.14.35,0	29, 5	38	25,1		
16	23.14.11,5	30, 0	44	25,0	23.14.41,7	62.00.51,4
24	156.44.45,1	29, 3	48	24,4		
25	23.14. 5,5	29, 4	47	24,5		
31	23.14. 8,3	29, 9	39	25,3	23.14.40,7	62.00.50,0
1801 Jan. 1	23.14. 8,5	29, 7	43	24,9		
3	156.44.47,0	29, 7	47	24,7		
18	156.45.14,6	29, 9	46	25,1	23.14.44,0	62.00.50,7
22	23.14.42,5	29, 6	44	24,9		
	Mean	-	-	-	-	62.00.50,0

Polaris.

Day of the Month.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1800	° ′ ″	° ′ ″
Nov. 2	37.00.30,3	37.00.3,2
4	37.00.30,8	37.00.3,0
7	37.00.31,3	37.00.2,4
11	37.00.32,7	37.00.2,7
17	37.00.36,0	37.00.4,2
18	37.00.36,3	37.00.4,3
19	37.00.35,7	37.00.3,4
20	37.00.36,3	37.00.3,8
21	37.00.37,6	37.00.4,8
25	37.00.40,1	37.00.5,8
27	37.00.39,5	37.00.4,9
29	37.00.40,3	37.00.5,2
30	37.00.40,1	37.00.4,8
Dec. 23	37.00.44,2	37.00.5,2
1801		
Jan. 1	37.00.44,3	37.00.4,6
21	37.00.44,2	37.00.5,0
24	37.00.44,7	37.00.5,8
25	37.00.44,3	37.00.5,2
Feb. 6	37.00.43,6	37.00.5,7
25	37.00 40,8	37.00.6,2
Mar. 2	37.00 39,3	37.00.5,8
25	37.00.33,4	37.00.5,6
31	37.00.30,6	37.00.4,2
April 1	37.00.30,9	37.00.4,8
2	37.00.29,7	37.00.3,9
3	37.00.29,9	37.00.4,5
4	37.00.29,2	37.00.4,4
5	37.00.28,4	37.00.3,9
13	37.00.28,2	37.00.5,5
June 11	37.00.15,0	37.00.3,5

N. B. These observations of the polar star were all made by reversing the instrument several times, before and after the star's passage over the meridian, allowing for the small change in altitude, according to the French tables constructed for that purpose.

Polaris. (continued.)

Day of the Month.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1801	° ′ ″	° ′ ″
June 13	37.00.16,5	37.00.5,0
21	37.00.17,0	37.00.5,4
Nov. 26	37. 1. 2,0	37.00.6,0
Dec. 7, 12	37. 1. 5,5	37.00.6,0
13, 14	37. 1. 6,2	37.00.6,5
16, 17, 18, 19	37. 1. 5,5	37.00.5,2

Polaris, S. P.

1800		
Oct. 31	40.30.52,0	40.31.18,6
Nov. 3	40.30.54,0	40.31.18,1
4	40.30.51,2	40.31.19,2
13	40.30.48,0	40.31.18,8
17	40.30.46,8	40.31.18,8
18	40.30.45,9	40.31.18,1
19	40.30.46,5	40.31.19,0
26	40.30.44,6	40.31.19,1
27	40.30.43,2	40.31.18,5
28	40.30.44,0	40.31.19,0
Dec. 10	40.30.41,8	40.31.19,0
1801		
June 3	40.31. 4,0	40.31.16,5

Polaris, S. P. (continued.)

Day of the Month.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1801	° ′ ″	° ′ ″
June 4	40.31. 5,7	40.31.17,6
5	40.31. 3,6	40.31.15,6
6	40.31. 5,7	40.31.17,5
8	40.31. 4,0	40.31.15,8
9	40.31. 3,5	40.31.15,2
10	40.31. 6,5	40.31.18,1
Nov. 8	40.30.27,7	40.31.18,7
13	40.30.25,8	40.31.18,2
18	40.30.26,0	40.31.20,0
19	40.30.25,9	40.31.20,1
20	40.30.25,1	40.31.19,5
25	40.30.23,2	40.31.19,0
27	40.30.23,4	40.31.19,8
Dec. 2	40.30.22,7	40.31.20,1
5	40.30.21,9	40.31.20,0

β Ursæ.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Dec. 24	23.42.55,2	29,4	44	25,2		
25	156.15.52,4	29,4	43	25,2		
26	156.15.52,5	29,6	41	25,5	23.43.31,4	23.44. 6,0
1801						
Jan. 1	23.42.55,7	29,9	43	25,7		
July 20	23.43.48,7	30,0	72	25,0	23.43.57,8	23.44. 8,3
21	156.15.53,1	30,0	70	25,0		

β *Ursæ. (continued.)*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1801	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Dec. 2	23.43.12,0	29,4	40	25,4		
6	23.43.11,9	29,4	40	25,4		
7	23.43.10,1	29,4	40	25,4	23.43.22,9	23.44. 8,8
9	156.16.27,1	29,3	46	25,0		
11	156.16.26,7	29,6	38	25,8		
12	23.43. 7,5	29,6	38	25,8		
13	23.43. 8,5	29,6	34	26,0	23.43.19,7	23.44. 8,2
18	156.16.28,5	30,0	32	26,5		
Mean	-	-	-	-	-	23.44. 7,8

β *Ursæ, S. P.*

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Reduced to January, 1800.
1800						
Dec. 15	126.11.38,6	30, 0	47	1.19,4		
16	126.11.35,7	30, 0	44	1.20,0		
24	53.47.22,1	29, 4	47	1.17,6		
25	126.11.29,7	29, 4	46	1.17,8	53.47.54,6	53.47.21,3
26	126.11.30,7	—	43	1.18,3		
27	126.11.30,2	29,67	43	1. 9,0		
1801						
Dec. 13	53.48. 1,6	29, 6	35	1.20,4	53.48. 9,5	53.47.21,5
14	126.11.42,5	29, 8	35	1.21,0		
16	126.11.38,8	29, 3	35	1.19,7		
17	126.11.36,4	29, 4	37	1.19,6	53.48.11,5	53.47.21,8
18	53.48. 0,3	29, 7	34	1.20,8		
19	53.48. 1,0	30, 1	33	1.23,0		
Mean	-	-	-	-	-	53.47.21,5

γ Draconis.

Day of the Month.	Observations corrected for Refraction.	Barom.	Therm.	Refraction.	Zenith Distance corrected for Refraction.	Mean Polar Distance for Jan. 1800. The Co-latitude 38°.45.'43",0
1800	° ′ ″	Inches.	°	′ ″	° ′ ″	° ′ ″
Dec. 3	0.16.40,25			0,25		
7	0.16.38,25				0.16.44,25	38.28.53,7
8	179.43.10,75					
24	0.16. 1,75					
26	179.42.45, 6				0.16.37, 6	38.28.52,8
1801						
Jan. 3	0.15.59,75					
13	179.43.46,25				0.16.31, 1	38.28.52,7
17	0.16.48, 5					
22	179.43.29, 5					
23	0.16.23, 8				0.16.27, 2	38.28.54,6
24	179.43.29, 5					
Feb. 6	0.16.18, 7				0.16.23, 0	38.58.54,7
13	179.43.32, 7					
	Mean	-	-	-	-	38.28.53,8

After the first part of this Paper went to the press, Dr. Maskelyne communicated to me some late corrections which Mr. Piazzi has made to his Catalogue. These having been adopted in the Tables which follow, the positive deviations do not now exactly equal the negative; but the correction required is very small. The Greenwich, Palermo, and Westbury observations were made about the same period, between 1800 and 1802, those of Armagh in the year 1797.

Comparison of the Observations made at Greenwich, Armagh, Palermo, and Westbury, with a Catalogue deduced from the Mean of these, and of some other Observations made with different circular Instruments.

	Greenwich. January, 1800.		Armagh.		Palermo.		Westbury. Co-lat. 38°.45′.43″,0.		Mean of all the Observations, reduced to Jan. 1800.
	° ′ ″		° ′ ″		° ′ ″		° ′ ″		° ′ ″
γ Draconis -	38.28.53,0	−0,8	38.28.52,5	−1,3	38.28.53,0	−0,8	38.28.53,8	+0,0	38.28.53,8
Capella -	44.13.21,5	+1,5	44.13.20,0	0.0	44.13.18,5	−1,5	44.13.18,5	−1,5	44.13.20,0
α Cygni - -	45.25.41,4	+2,6	45.25.38,0	−0,8	45.25.39,6	−0,8	45.25.37,0	−1,8	45.25.38,8
α Lyræ - -	51.23.41,1	+3,4	51.23.35,8	−1,9	51.23.37,8	+0,1	51.23.36,0	−1,7	51.23.37,7
Castor - -	57.41.14,0	0 0	*57.41. 8,0	—	57.41.14,0	0 0	57.41.14,0	0.0	57.41.14,0
Pollux -	61.30. 9,8	−2,2	*61.30. 3,8	—	61.30.12,2	+0,2	61.30.13,7	+1,7	61.30.12,0
β Tauri -	61.34.30,9	−1,6	61.34.31,0	−1,5	61.34.34,8	+2,3	61.34.33,7	+1,2	61.34.32,5
α Andromedæ	62.00.45,8	−1,2	62.00.43,7	−3,3	62.00.48,5	+1,5	62.00.50,0	+3,0	62.00.47,0
α Coronæ Bor.	62.36.10,5	+0,3	*62.36. 6,0	—	62.36.10,8	+0,6	62.36.13,0	+2,8	62.36.10,2
α Arietis -	67.29.20,1	−1,3	67.29.22,0	+0,6	67.29.22,7	+1,3	67.29.20,6	−0,8	67.29.21,4
Arcturus -	69.46. 7,8	−1,2	69.46. 9,7	+0,7	69.46.11,0	+2,0	69.46. 7,5	−1,5	69.46. 9,0
Aldebaran	73.54.16,6	−0,2	73.54.17,0	+0,2	73.54.18,0	+1,2	73.54.15,5	−1,3	73.54.16,8
β Leonis -	74.18.34,5	+0,8	74.18.32,7	−1,0	74.18.35,0	+1,3	74.18.32,5	−1,2	74.18.33,7
α Pegasi -	75.51.57,0	−2,0	75.51.59,8	+0,8	75.52. 1,0	+2,0	75.51.58,0	−1,0	75.51.59,0
α Pegasi -	75.55.36,3	−0,7	75.55.36,2	−0,8	75.55.38,5	+1,5	75.55.37,0	0.0	75.55.37,0
Regulus - -	77. 3.35,1	+1,1	77. 3.30,7	−3,3	77. 3.37,5	+3,5	77. 3.34,0	0.0	77. 3.34,0
α Ophiuchi	77.16.54,0	+0,6	77.16.52,1	−1,3	77.16.54,0	+0,6	77.16.53,5	+0,1	77.16.53,4
α Aquilæ -	81.38.52,0	+1,5	81.38.49,3	−1,1	81.38.55,0	+4,5	81.38.51,5	+1,0	81.38.50,5
α Orionis -	82.38.30,8	−0,7	82.38.30,5	−1,2	82.38.33,0	+2,3	82.38.31,5	0.0	82.38.31,5
α Serpentis -	82.56. 1,2	−0,8	82.55.58,5	−3,5	82.56. 5,8	+3,8	82.56. 2,2	+0,2	82.56. 2,0
Procyon -	84.16.17,4	−3,1	84.16.18,0	−2,5	84.16.22,0	+1,0	84.16.21,5	+1,0	84.16.20,5
α Ceti - -	86.42. 6,1	−1,5	86.42. 6,0	−2,2	86.42.10,8	+0,6	86.42.10,2	+2,0	86.42. 8,2
α Aquarii -	91.16.59,8	−3,2	91.17. 3,3	+0,3	91.17. 3,7	+0,7	91.17. 4,6	+1,6	91.17. 3,0
α Hydræ -	97.47.49,1	−1,5	97.47.47,5	−3,1	97.47.54,0	+3,4	97.47.53,0	+2,4	97.47.50,6
Rigel - -	98.26.28,8	−5,3	98.26.31,7	−2,4	98.26.35,5	+1,4	98.26.36,5	+2,5	98.26.34,1
Spica Virginis	100. 6.37,0	−3,0	100. 6.37,5	−2,5	100. 6.42,8	+2,8	100. 6.43,0	+3,0	100. 6.40,0
α Capricorni	103. 9. 3,2	−4,9	103. 9.12,0	+3,9	103. 9. 9,2	+1,1	103. 9. 8,0	−0,1	103. 9. 8,1
Sirius - -	106.26.56,3	−5,5	106.27. 3,8	+2,0	106.27. 5,0	+3,2	106.27. 2,0	+0,2	106.27. 1,8
Polaris - -	1.45.34,5	—	1.45.34,5	—	1.45.36,2	—	1.45.36,9	—	1.45.36,0

The observations marked * are omitted in the calculation.

The Greenwich Observations compared with those made by the circular Instruments, the Co-latitudes of the Places of Observation being previously corrected by Means of their positive and negative Deviations.

	Greenwich.		Armagh.		Palermo.		Westbury. Co-lat. 38°.45′.42″,8.		Mean of circular Instruments reduced to January, 1800.
	° ′ ″		° ′ ″		° ′ ″		° ′ ″		° ′ ″
γ Draconis	38.28.53,0	−0,6	38.28.53,8	+0,2	38.28.52,0	−1,6	38.28.53,6	0.0	38.28.53,6
Capella	44.13.21,5	+1,5	44.13.21,3	+1,3	44.13.18,5	−1,5	44.13.18,3	−1,7	44.13.20,0
α Cygni	45.25.41,4	+2,6	45.25.39,3	+0,5	45.25.38,4	−0,4	45.25.36,8	−2,0	45.25.38,8
α Lyræ	57.23.41,1	+4,6	51.23.37,1	+0,6	51.23.36,8	+0,3	51.23.35,8	−0,7	51.23.36,5
Castor	57.41.14,0	+1,0	*57.41. 9,3	——	57.41.13,0	0.0	57.41.13,8	+0,8	57.41.13,0
Pollux	61.30. 9,8	−2,5	*61.30. 4,1	——	61.30.11,2	−1,1	61.30.13,5	+1,2	61.30.12,3
β Tauri	61.34.30,9	−2,1	61.34.32,3	−0,7	61.34.33,8	−0,6	61.34.33,5	+0,5	61.34.33,0
α Andromedæ	62.00.45,8	−1,7	62.00.45,0	−2,5	62.00.47,5	0.0	62.00.49,8	+2,3	62.00.47,5
α Coron. B.	62.36.10,5	+0,5	62.36. 7,3	−2,7	62.36. 9,8	−0,2	62.36.12,8	+2,8	62.36.10,0
α Arietis	67.29.20,1	−1,4	67.29.22,0	+0,5	67.29.21,7	+0,2	67.29.20,5	−1,0	67.29.21,5
Arcturus	69.46. 7,8	−1,2	69.46.11,0	+2,0	69.46.10,3	+1,2	69.46. 7,3	−1,7	69.46. 9,0
Aldebaran	73.54.16,6	−0,3	73.54.18,3	+1,4	73.54.16,8	+0,1	73.54.15,3	−1,6	73.54.16,9
β Leonis	74.18.34,5	+1,0	74.18.34,0	+0,5	74.18.33,5	+0,5	74.18.32,3	−1,2	74.18.33,5
α Pegasi	75.51.57,0	−2,7	75.52. 1,0	+1,3	75.52. 0,8	+1,1	75.51.57,8	− ,9	75.51.59,7
γ Pegasi	75.55.36,3	−1,9	75.55.37,5	−0,7	75.55.41,4	+3,2	75.55.36,8	−1,4	75.55.38,2
Regulus	77. 3.35,1	+1,1	77. 3.32,0	−2,0	77. 3.36,0	+2,0	77. 3.33,8	−0,2	77. 3.34,0
α Ophiuchi	77.16.54,0	+0,8	77.16.53,4	+0,2	77.16.53,0	−0,2	77.16.53,3	+0,1	77.16.53,2
α Aquilæ	81.38.52,0	+1,0	81.38.50,6	−0,4	81.38.53,5	+2,5	81.38.51,3	+0,3	81.38.51,0
α Orionis	82.38.30,8	−0,9	82.38.31,8	+0,1	82.38.32,0	+0,3	82.38.31,3	−0,4	82.38.31,7
α Serpentis	82.56. 1,2	−1,1	82.55.59,8	−2,4	82.56. 5,2	+2,9	82.56. 2,0	−0,3	82.56. 2,3
Procyon	84.16.17,4	−3,6	84.16.19,3	−1,7	84.16.21,0	0.0	84.16.21,3	+0,3	84.16.21,0
α Ceti	86.42. 6,1	−2,9	86.42. 7,3	−1,3	86.42. 9,8	+0,8	86.42.10,2	+1,2	86.42. 9,0
β Virginis	87. 6.26,3	−2,0	87. 6.29,0	+0,7	87. 6.27,5	−0,8	not observed	——	87. 6.28,3
α Aquarii	91.16.59,8	−4,3	91.17. 4,6	+0,5	91.17. 3,2	−0,9	91.17. 4,6	+0,5	91.17. 4,1
α Hydræ	97.47.49,1	−3,0	97.47.48,8	−3,2	97.47.54,0	+2,0	97.47.53,0	+1,0	97.47.52,0
Rigel	98.26.28,8	−6,0	98.26.33,0	−1,8	98.26.34,5	−0,3	98.26.36,3	+1,5	98.26.34,8
Spica Virginis	100. 6.37,0	−3.8	100. 6.38,8	−2,0	100. 6.41,8	+1,0	100. 6.42,8	+2,0	100. 6.40,8
2 α Capricorni	103. 9. 3,2	−5,1	*103. 9.13,3	——	103. 9. 8,2	−0,1	103. 9. 7,8	−0,5	103. 9. 8,3
α Libræ	105.11.55,6	−6,2	105.12.00,9	−0,9	105.12. 2,7	+0,9	not observed	——	105.12. 1,8
Sirius	106.26.56,3	−7,2	106.27. 4,1	+0,6	106.27. 4,0	+0,5	106.27. 1,8	−1,7	106.27. 3,5
Antares	115.58.14,4	−9,7	115.58.24,3	——	115.58.24,0	——	not observed	——	115.58.24,1
Fomalhaut	120.40.30,9	−9,3	——	——	120.40.40,2	——	not observed	——	——
Polaris	1.45.34,5	——	1.45.34,5	——	1.45.36,2	——	1.45.37,0	——	1.45.36,0

The stars marked * are omitted in the comparison.